PATENT COOPERATION TREATY

From the
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

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PCT

NOTIFICATION OF TRANSMITTAL OF THE INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Rule 71.1)

Date of mailing *(day/month/year)*	08.04.2005

Applicant's or agent's file reference	IMPORTANT NOTIFICATION
WO 21.1065	

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/EP 03/13147	21.11.2003	31.12.2002

Applicant
SERVICES PETROLIERS SCHLUMBERGER et al.

1. The applicant is hereby notified that this International Preliminary Examining Authority transmits herewith the international preliminary examination report and its annexes, if any, established on the international application.

2. A copy of the report and its annexes, if any, is being transmitted to the International Bureau for communication to all the elected Offices.

3. Where required by any of the elected Offices, the International Bureau will prepare an English translation of the report (but not of any annexes) and will transmit such translation to those Offices.

4. **REMINDER**

The applicant must enter the national phase before each elected Office by performing certain acts (filing translations and paying national fees) within 30 months from the priority date (or later in some Offices) (Article 39(1)) (see also the reminder sent by the International Bureau with Form PCT/IB/301).

Where a translation of the international application must be furnished to an elected Office, that translation must contain a translation of any annexes to the international preliminary examination report. It is the applicant's responsibility to prepare and furnish such translation directly to each elected Office concerned.

For further details on the applicable time limits and requirements of the elected Offices, see Volume II of the PCT Applicant's Guide.

The applicant's attention is drawn to Article 33(5), which provides that the criteria of novelty, inventive step and industrial applicability described in Article 33(2) to (4) merely serve the purposes of international preliminary examination and that "any Contracting State may apply additional or different criteria for the purposes of deciding whether, in that State, the claimed inventions is patentable or not" (see also Article 27(5)). Such additional criteria may relate, for example, to exemptions from patentability, requirements for enabling disclosure, clarity and support for the claims.

Name and mailing address of the international preliminary examining authority:

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PATENT COOPERATION TREATY

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INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference WO 21.1065 .	**FOR FURTHER ACTION**	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
International application No. PCT/EP 03/13147	International filing date *(day/month/year)* 21.11.2003	Priority date *(day/month/year)* 31.12.2002
International Patent Classification (IPC) or both national classification and IPC G01V5/04		
Applicant SERVICES PETROLIERS SCHLUMBERGER et al.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 6 sheets, including this cover sheet.

   ☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

   These annexes consist of a total of 3 sheets.

3. This report contains indications relating to the following items:

   - I ☒ Basis of the opinion
   - II ☐ Priority
   - III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
   - IV ☐ Lack of unity of invention
   - V ☒ Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
   - VI ☐ Certain documents cited
   - VII ☐ Certain defects in the international application
   - VIII ☐ Certain observations on the international application

Date of submission of the demand	Date of completion of this report
29.07.2004	08.04.2005
Name and mailing address of the international preliminary examining authority: European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized Officer Juárez Colera, M Telephone No. +49 89 2399-2482

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/EP 03/13147

I. Basis of the report

1. With regard to the **elements** of the international application *(Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17))*:

Description, Pages

1-16 as originally filed

Claims, Numbers

1-11 received on 17.03.2005 with letter of 17.03.2005

Drawings, Sheets

1/9-9/9 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:
- ☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)).

   (Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	1-11
	No:	Claims	
Inventive step (IS)	Yes:	Claims	
	No:	Claims	1-11
Industrial applicability (IA)	Yes:	Claims	1-11
	No:	Claims	

2. Citations and explanations

   see separate sheet

Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1 Important clarity objections (Article 6 PCT)

1.1 From the wording of claims 1 and 6 it is not clear whether the step of performing spectral stripping is performed downhole or at the surface and where the corresponding processor is situated.

1.2 As it is formulated, claim 1 does not specify that all the raw spectroscopy data processing is performed downhole and therefore, it leaves open the possibility of the spectral stripping being executed both downhole and at the surface.

1.3 Similarly, claim 6 does not clarify whether the feature that the means for performing the spectral stripping are downhole means or surface means.

2 Prior art

Reference is made to the following documents:

D1: US-A-5 539 225
D2: US2002153888
D3: WO9817894

The documents D2 and D3 were not cited in the international search report. Copies of the documents are appended hereto.

3 Article 33 (1) and (2) PCT (Novelty)

3.1 None of the available prior art documents discloses an acoustic logging apparatus with the combination of features described in claims 1 and 6. The subject matter of these claims is therefore new.

3.2 Claims 2-5 and 7-11 are dependent on claims 1 and 6 respectively and as such also

meet the requirements of the PCT with respect to novelty.

4 Objections under article 33 (1) and (3) PCT (Inventive Step)

4.1 The above-mentioned lack of clarity notwithstanding, the subject-matter of claims 1-11 does not involve an inventive step in the sense of Article 33(3) PCT, and therefore the criteria of Article 33(1) PCT are not met. The reasons are as follows.

4.2 The document D1 discloses (abstract; c.6, l. 14-22; c. 8, l. 54-59; c. 9, l. 1-19; c. 16, l.7-11, c.18, l. 16-19 and Fig.1): a method and apparatus for downhole spectroscopy processing comprising the steps of- and the corresponding means for obtaining raw spectroscopy data, processing them downhole and transmitting the obtained downhole processed solution to a surface processing system to determine lithology information.

4.3 The subject-matter of claims 1 and 6 therefore differs from that of D1 in that it includes the feature of part of the data processing, i.e. obtaining a net capture spectra and performing spectral stripping, being performed downhole.

4.4 The problem to be solved by the present invention may therefore be regarded as decreasing data volume to be sent to the surface.

4.5 Including downhole means to perform part of the data processing is considered as widely know in the art and moreover has already been employed for the same purpose, i.e. for determination of lithology, and for solving the same problem, in similar tools, see, e.g. documents D2 (abstract and p.2, col.1, l. 59-63) and D3 (p.61, l. 1-3). It would be obvious to the person skilled in the art, namely when the same result is to be achieved, to apply this feature with corresponding effect to a tool according to document D1, thereby arriving at a method and apparatus according to claims 1 and 6.

4.6 Dependent claims 2-5 and 7-11 do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of inventive step.

4.7 The additional features introduced by those claims constitute part of the normal processing techniques known by the persons skilled in the art. They are therefore considered as merely some of several straightforward possibilities from which the skilled person would select, in accordance with circumstances, without the exercise of inventive skill.

4.8 Consequently the present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of the above-mentioned claims does not involve an inventive step in the sense of Article 33(3) PCT.

5 Article 33 (1) and (4) PCT (Industrial Applicability)

The subject matter of claims 1-11 is susceptible of industrial application.

Claims

1- A method for downhole spectroscopy processing comprising:

obtaining raw spectroscopy data using a downhole tool;

processing downhole the raw spectroscopy data using the downhole tool to obtain a downhole processed solution;

transmitting the downhole processed solution to a surface processing system; and

using the surface processing system to determine lithology information from the downhole processed solution

wherein processing the raw spectroscopy data comprises:

pre-processing downhole the raw spectroscopy data to obtain a net capture spectra; and

performing spectral stripping using time information and the net capture spectra to determine elemental yields.

2- The method of claim 1, wherein processing comprises time-stacking the raw spectroscopy data.

3- The method of claim 1 or claim 2, further comprising comparing the downhole processed solution with data obtained from another downhole tool.

4- The method of any of claims 1-3, further comprising displaying the lithology information on a user interface.

5- The method of any of claims 1-4, wherein processing the raw spectroscopy data further comprises:

determining dry weight elemental concentrations using the elemental yields;

determining a dry weight for at least one selected from the group consisting of clay, carbonate, quartz-feldspar-mica, pyrite, anhydride, siderite, salt, and coal using the dry weight elemental concentrations; and

computing a matrix property using the dry weight elemental concentrations.

6- A downhole tool for processing raw spectroscopy data, comprising:

at least one detector for detecting the raw spectroscopy data;

processing means for processing the raw spectroscopy data to produce a downhole processed solution; and

means for transmitting the downhole processed solution to a surface location,

wherein the processing means comprises:

means for pre-processing the raw spectral data to obtain a net capture spectra;

means for performing spectral stripping using time information and the net capture spectra to determine elemental yields

7- The downhole tool of claim 6, wherein the processing means comprises means for determining elemental yields.

8- The downhole tool of claim 6 or claim 7, wherein the processing means comprises means for computing a matrix property.

9- The downhole tool of any of claims 6-8, wherein the processing means further comprises means for determining dry weight elemental concentrations using the elemental yields.

10- The downhole tool of claim 9, wherein the processing means further comprises:

means for determining a dry weight for at least one selected from the group consisting of clay, carbonate, quartz-feldspar-mica, pyrite, anhydride, siderite, salt, and coal using the dry weight elemental concentrations; and

means for computing a matrix property using the dry weight.

11- The downhole tool of any of claims 6-10, wherein the processing means comprises:

a digital signal processor (516);

a power supply (520) operatively connected to the digital signal processor (516);

a local memory (518) operatively connected to the digital signal processor (516); and

a processing interface (514) operatively connected to the digital signal processor (516).